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Approved For Release 2003/08/05 : CIA-RDP78B05171A000300030015-8

HPIC/TSSG/ESD/EL-63/69

8 JUL 1969

MEMORANDUM FOR: Director, National Photographic Interpretation Center

SUBJECT: Continuation of [REDACTED]

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1. This memorandum requests approval for the commitment of funds for a contract. The specific request is noted in paragraph 10.

2. From time to time the photointerpreter wishes to obtain information from film which was degraded during the taking process. At present, the only tools which can be used for the extraction of this information merely "make do" with the degraded record and do not attempt to remove the effects of the anomaly. As a consequence, the interpretation of specific items of interest may be extremely difficult or even impossible, and mensuration will be far less accurate than what could have been achieved in the absence of the degradation. Recently, techniques have been envisioned which in theory offer a solution to these problems. In order to assess these techniques, HPIC is engaged in a comprehensive enhancement and restoration program. A portion of this total effort is the Digital Image Restoration program, whose purpose is to study these new techniques using a digital computer and associated hardware, and to demonstrate the feasibility of applying them to operational problems. If successful, it will mean an increase in the accuracy of interpretation and mensuration data extracted from materials degraded by atmospheric scattering, defocus, image motion, or film grain.

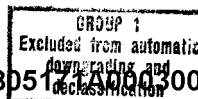
3. When the Digital Image Restoration program with the [REDACTED] was begun in 1966, it was envisioned as a five year program to be funded by CIA at a level of [REDACTED] per year. The first two years of effort were spent primarily on building the required facilities and developing the appropriate tools necessary for carrying on the research. The last three years of the program were envisioned as data producing efforts directed specifically toward demonstrating the feasibility of

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applying the techniques to operational problems. In this case, operational problems imply work at high spatial frequencies (i.e., small images). The experimental rationale has been to begin work at low spatial frequencies (large images) and then move to higher spatial frequencies (smaller images) as the physics of the techniques were determined and capabilities demonstrated. In terms of spatial frequencies, the third year of the program would evaluate restorations in the 1-50 line-per-millimeter range, the fourth year in the 50-100 line-per-millimeter range, and the fifth year for ranges in excess of 100 lines per millimeter range, hopefully up to 200 lines per millimeter.

4. At present, the third year's funding effort is coming to a close. This work has demonstrated that for degradations recorded on film using a camera system, where information recovery in the 1-50 line per millimeter range was required, both interpretation and mensuration tasks can be considerably improved. With this achievement, it is now appropriate to evaluate the status of the program in order to determine the wisdom of pursuing the goals set forth in the original program plan. Funding, however, expired on 1 July 1969 and unless an interim program is maintained, there is a grave danger that the contract personnel will be dispersed, thus causing irreparable damage. It is vital that work be continued in order to not adversely affect future work should a recommendation to continue be made.

5. Four tasks to be addressed during this period are: on-line computer operation, equipment engineering, basic restoration investigations, and dual-gamma (a new processing scheme) studies. The first two tasks, on-line computer operations and equipment engineering, are minor tasks requiring only a small percentage of time and funds, since most of these developments have already been made. As detailed in the proposal, they consist only of making software modifications as required by the specific research efforts and packaging the improved display equipment begun a year and a half ago. By far the major effort will be concentrated in basic restoration investigations and dual gamma studies. In the area of basic restoration techniques, a limited effort will be made exploring some potentially rewarding techniques using some rather unconventional and esoteric mathematical functions. A preliminary system analysis will be made

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in the form of a computer study to define the relationship between the amount of allowable degradation, system resolution, film granularity, and level of success of the restoration. Image motion degradations studies will proceed, pushing toward the 100 line per millimeter goal. With the advent of dual gamma processing of operational materials, it was decided, in April 1969, that this facet of the operational environment should be explored to determine its impact on the DIR program. Using samples of non-classified imagery made available to the contractor, dual gamma artifacts will be studied and compared to computer models and simulations in hope of isolating and defining the effects on image restoration. Special experiments will be conducted to determine the relationship between certain dual gamma effects and various density levels in the scene. There are also indications from work done in May 1969 that whereas dual gamma may enhance sharp imagery, it may in fact serve only to further degrade imagery collected in the presence of some degradation. Work during the proposed continuation period will provide a quantitative analysis of this problem.

6. The work to be performed during this extension is based on the work done previously by the contractor. The equipment in use has been painstakingly developed and has proven to be a dependable and repeatable scientific tool. Early work done by the contractor has been independently corroborated and the hypotheses and assumptions then made have been shown to be consistent with those made by others working independently on other problems. There is little risk in the schedule and a high degree of certainty that the work outlined by the contractor will be performed and that the results will be pertinent. The items to be delivered consist of complete experimental reports on the specific tasks and a final report which will tie-in the results of the current effort to the overall program.

7. The [] has been funded by this Agency for this program since 2 May 1966 and consequently has established a dedicated facility, trained specialized personnel, and has evolved to a level of technical capability which is unique in this research field. Because of our prior investment with this contractor and his record of significant achievements, he was chosen to continue the program. The cost of this three month effort will be [] From the beginning of this program, the funding has been shared by the Advanced Research Projects Agency. Their funding level will remain at [] for FY 70.

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8. Should the results generated during this three month effort continue to demonstrate that the goals originally set forth will be achieved, a follow-on action will be recommended. The cost and scope of this follow-on action will be based upon an assessment of the proposed work relative to the overall goals set forth when the DIR program was begun and the total NPIC R&D program. A recommendation to continue through the end of FY 70 with no change in scope or pace would require a [] level of effort.

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9. This work is unclassified and the association of the Agency with the contractor is unclassified; however, since this is a university contract, certain precautions have been taken to prevent any inadvertent embarrassment to either party. Although the possibility of the business offices of the University being ransacked and the files violated is small, such an occurrence could lead to the discovery of the contract and much unwanted (and unkind) publicity to both the principal parties and certain key individuals. As a consequence, all University files on the contract have been moved to the [] (this is within a military reservation, 15 miles away from the campus) and the initials or words identifying the Agency have been deleted from all related records and correspondence which are processed through the main University business office.

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10. It is requested that funds in the amount of [] from FY 70 research and development funds be authorized for the continuation of the Digital Image Restoration Program for a three-month period.

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Chief, Technical Services & Support Group,
NPIC

Attachments:

1. Form 2420
2. [] Proposal
3. Proposal Supplement
4. NPIC/TSSG/ESD/EL-55/69 Memorandum

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APPROVAL:

[]

24 JUL 1969

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ARTHUR C. LORDAHL

Date

Director

National Photographic Interpretation Center

Distribution:

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NPIC/TSSG/ESD/EL/ [] 2 July 1969)

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OFFICE/DIV/BR TSSG/ESD/EL		REQUEST NO.	DATE OF REQUEST 27 June 1969	I CERTIFY THAT FUNDS IN THE ESTIMATED AMOUNT OF \$ _____ ARE AVAILABLE. CHARGE TO FAN 02555310	
PROJECT TITLE Digital Image Restoration		PROJECT OR CONTACT OFFICER [REDACTED] R. IVA		SIGNATURE OF BUDGET OFFICER [REDACTED] DATE 25X1	
CONTRACTOR (if known)		PROPOSAL NO. AND DATE [REDACTED] 26 June 1969		CONTRACT & TASK ORDER NO. (if known) 6	
TYPE OF SERVICE REQUESTED		APPLICABLE ONLY TO REPAIRS AND MODIFICATIONS			
<input checked="" type="checkbox"/> RESEARCH/DEV <input type="checkbox"/> GRANT <input type="checkbox"/> REPAIR <input type="checkbox"/> MAINTENANCE <input type="checkbox"/> MODIFICATION		TRANSFER OF FUNDS TO OTHER GOVT. AGENCY (specify if applicable)			
		<input type="checkbox"/> RECEIVING DEPOT T & I <input type="checkbox"/> TECHNICAL MONITOR NA <input type="checkbox"/> ITEMS TO BE PICKED UP OR <input type="checkbox"/> SERVICES PERFORMED AT: NA ITEMS TO BE REDELIVERED TO:			
STERILITY <input checked="" type="checkbox"/> SC 0 <input type="checkbox"/> SC 1 <input type="checkbox"/> SC 2		CONTRACT CLASSIFICATION	WORK CLASSIFICATION	HARDWARE CLASSIFICATION	REPORTS CLASSIFICATION
SHORT SUBSTANTIVE TITLE		[REDACTED]			

Continue Research Program in Image Processing
Principal investigator: [REDACTED]
Work to be performed at: [REDACTED]

(See reverse for specific information
required on R&D requests.)

DESIGNATION	APPROVAL SIGNATURE		DATE
PROCUREMENT DIVISION USE			
TE RECEIVED IN PD	RECORDED BY	SECTION ASSIGNED TO	NEGOTIATOR

RM 2420 REPLACES FORMS
67 2420 AND 2416
WHICH MAY BE
USED.

UNCLASSIFIED

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(specify)

5-12-38)

1. JUSTIFICATION **Approved For Release 2003/08/05 : CIA-RDP78B05171A000300030015-8**

Follow-On Study Contract

2. PROPOSAL

NA

3. DELIVERABLE ITEMS

REPORTS REQUIRED

4

NO. OF COPIES

☐

MONTHLY

☒

INTERIM

☐

QUARTERLY

☒

FINAL

HARDWARE (state type and number)

OTHER

4. GFE REQUIRED

None

5. SPECIAL INSTRUCTIONS

None

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